

The FAU SIAM student chapter invites you to a talk by

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Ensemble Kalman Filter for non-conservative moving mesh solvers with a joint physics and mesh location update

Friday, November 20, 2020

4:00pm EST

Open to all and live on [Zoom](#) with the passcode: Fall2020

Abstract

Numerical solvers using adaptive meshes can focus computational power on important regions of a model domain capturing important or unresolved physics. The adaptation can be informed by the model state, external information, or made to depend on the model physics. In this latter case, one can think of the mesh configuration *as part of the model state*. If observational data is to be assimilated into the model, the question of updating the mesh configuration with the physical values arises. Adaptive meshes present significant challenges when using popular ensemble Data Assimilation (DA) methods. We develop a novel strategy for ensemble-based DA for which the adaptive mesh is updated along with the physical values. This involves including the node locations as a part of the model state itself allowing them to be updated automatically at the analysis step. This poses a number of challenges which we resolve to produce an effective approach that promises to apply with some generality. We evaluate our strategy with two testbed models in 1-d comparing to a strategy that we previously developed that does not update the mesh configuration. We find updating the mesh improves the fidelity and convergence of the filter. An extensive analysis on the performance of our scheme beyond just the RMSE error is also presented.

About the speaker

Christian Sampson is a Postdoctoral Fellow at the University of North Carolina Chapel Hill working under the direction of Professor Chris Jones. He received his P.hD in 2017 from the University of Utah where he used the tools of applied mathematics to study sea ice and the polar regions under the direction of Ken Golden, with whom he participated in the Sea Ice and Physics Ecosystem Experiment (SIPEX II) Antarctic cruise in 2012. From 2017-2018 he participated in the year-long Mathematics and Statistics of Climate program at the Statistical and Applied Mathematics Institute (SAMSI) in Research Triangle Park, North Carolina. Recently, he has begun working in the field of Data Assimilation with applications to geophysical modeling.

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